

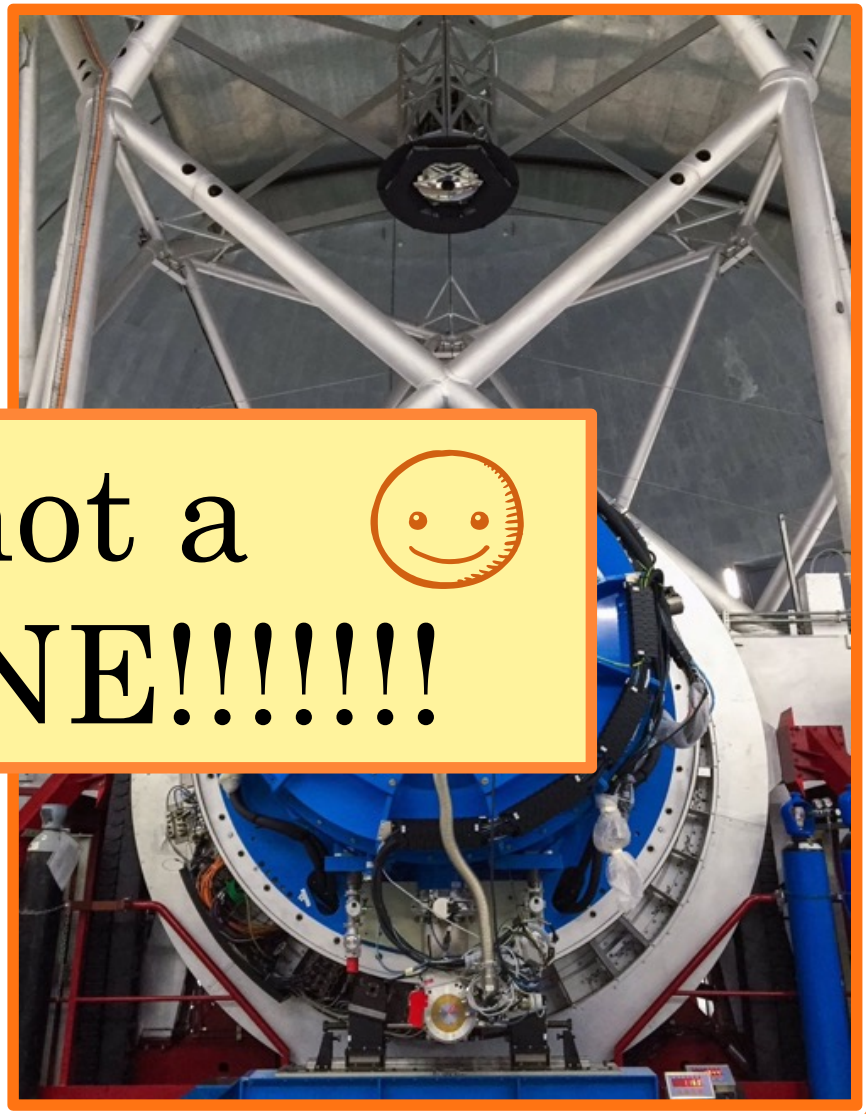


EMIR Data Reduction: External Scripts

Nieves Castro-Rodríguez

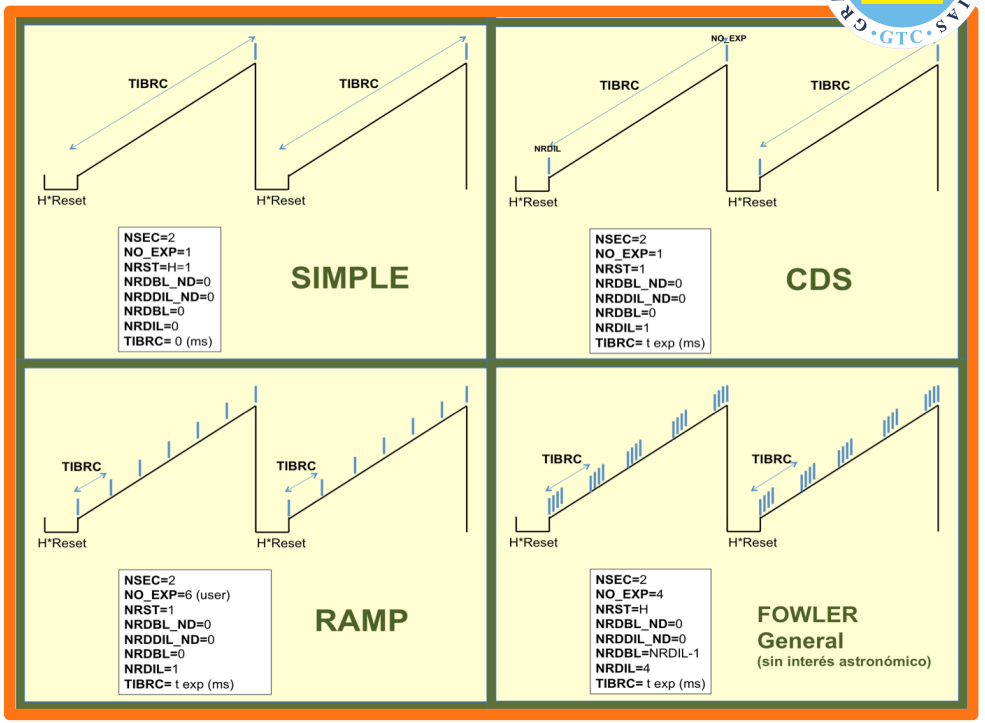
SUMMARY:

- Data Type
  - Data Structure
  - Readout Modes
  - Ob
- DRP
- Scrip
  - Ba
  - Sky Flat-Fields
  - Image
  - Spectra (Long Slit)



This is not a PIPELINE!!!!!!

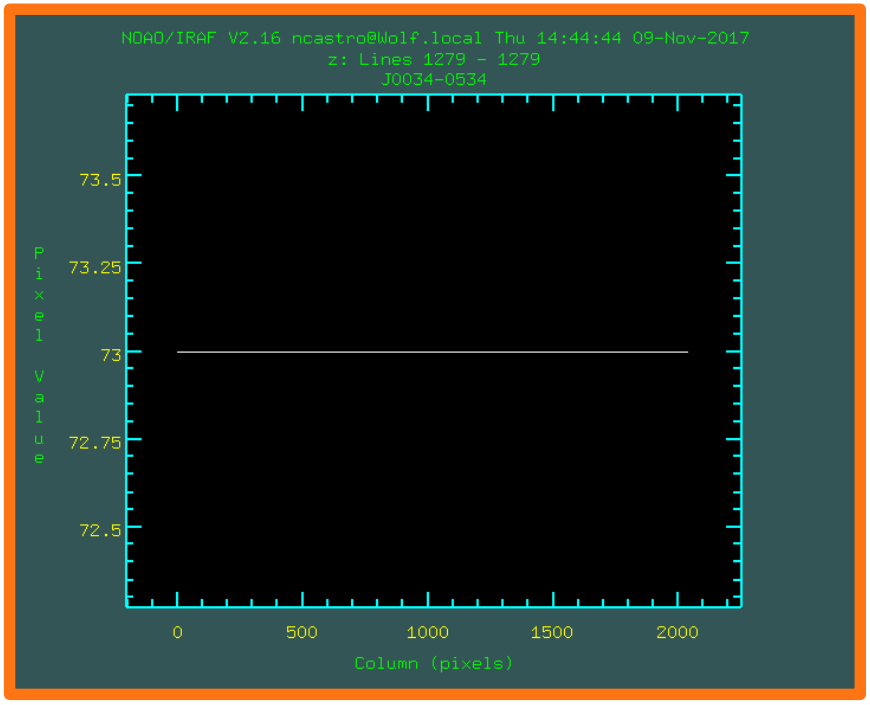
READOUT MODES



- **CDS**
  - Two Images
  - Individual Exp. Time
    - 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10 y 15 s
- **RAMP**
  - Several Images: 5, 10, etc (dep. of exp. time)
  - Individual Exposure Times permitted: 20.0, 30.0, 60.0, 120-360 s (steps of 40 s)
- **Pre-Redu.**
  - **<file_number>-YYYYMMDD-EMIR-<OBSMODE>.fits**

DATA STRUCTURE

- If we have an image 0001322750-20170904-EMIR-STARE_IMAGE.fits
  - [0]
  - [1]

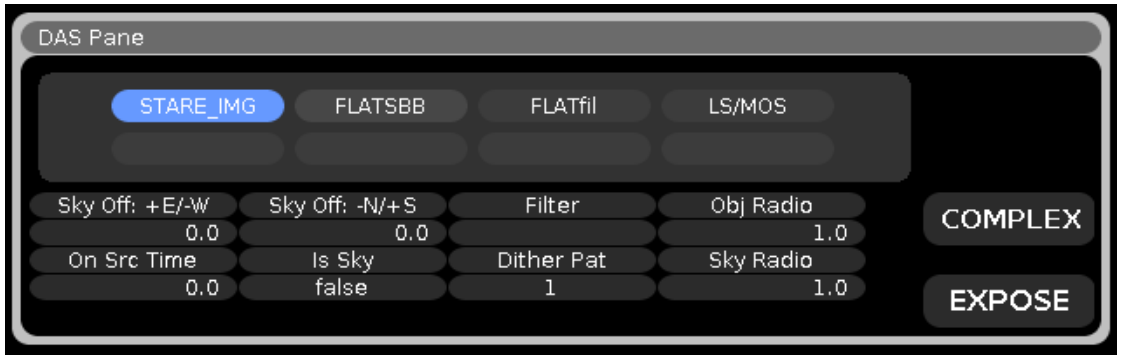


TYPICAL OBSERVATIONS

-Filter-	-Tot. Exptime- (s)	-Single Int. Time- (s)	-Offset Pattern-	-Offsets Size- (arcsec)	-Sky-	-offset RA- (arcsec)	-Offset Dec- (arcsec)	-Offset Size- (arcsec)
Ks	360	default	Pattern 7	50	☐			

-Grism-	-On source exptime- (s)	-Single Int. Time- (s)	-Initial offset- (along the slit)	-Sky offset RA- (arcsec)	-Sky offset Dec- (arcsec)
grism H	480	default		500	250

-Grism-	-On source exptime- (s)	-Single Int. Time- (s)	-Initial offset- (along the slit)	- ABBA Throw - (arcsec)
grism J	960	240		12





Phase 2 and Telescope

DATAREDUCTION

- DRP (UCM)
  - Online
  - Offline
- GTC Scripts
  - Python+Pyraf
  - Basic Reduction
  - Script per Recipe
  - Some add. Modules:
    - python
    - iraf
    - astropy
    - scipy



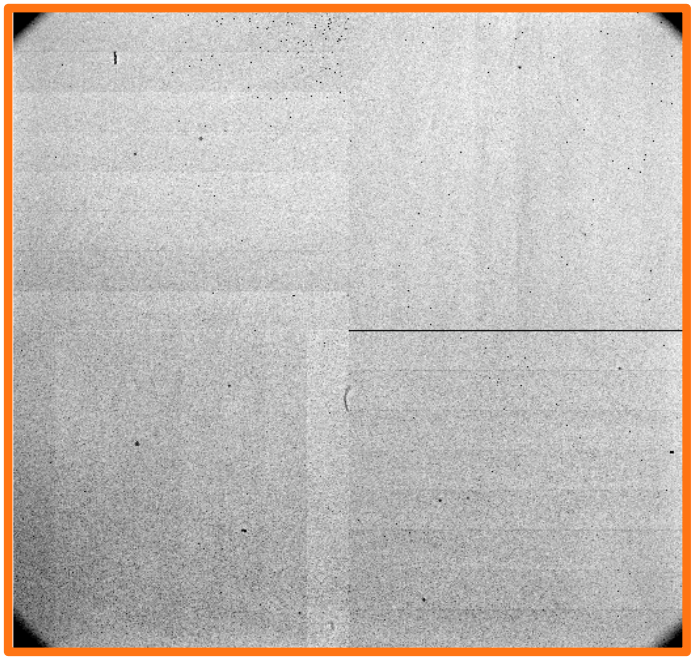


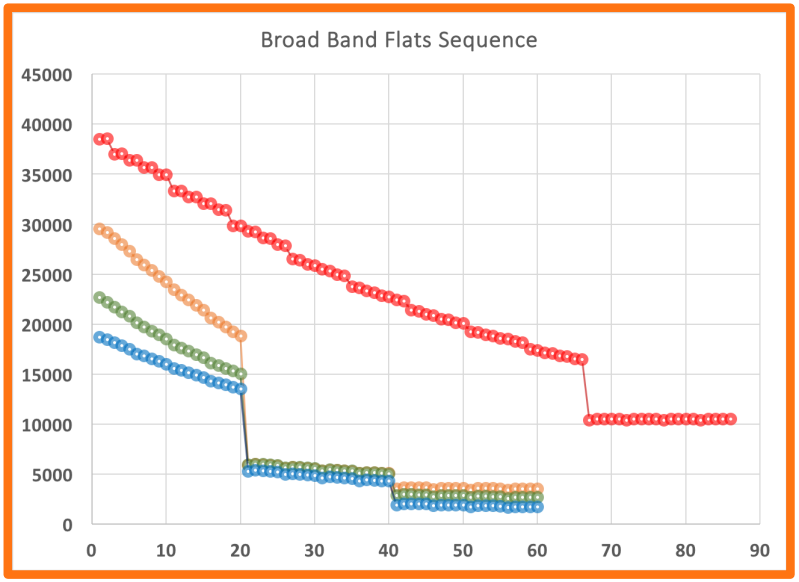
OBSERVING MODES

- **Flats**: =TEST8 (272 images) Kshort,H,J and Y
  - Iter Ks:9
  - Nsec Ks:8
  - Iter Filters:3
  - Nsec Filters:20
  - FlatType: SKY or DOME.
- **TEST0:** Adquisition Images, Arcs or Tests
- **STARE_IMAGE**: Image Mode with Dithering
- **SKY_IMAGE:** Image Mode + **SKY**
- **STARE_SPECTRA:** Spectra **ABBA**
- **SPEC_SKY**: Spectra **+ SKY**
- **Other tests**: TEST6, TEST12

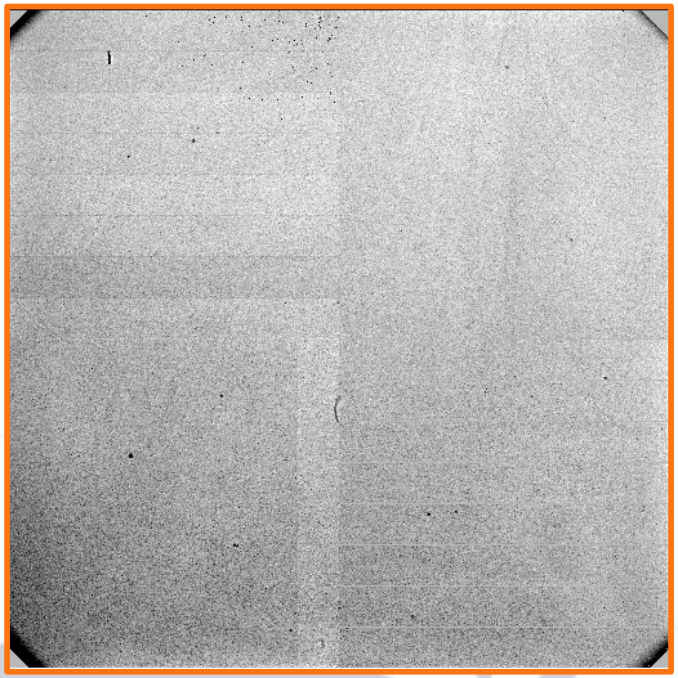
COSMETICS & SKY FLATS

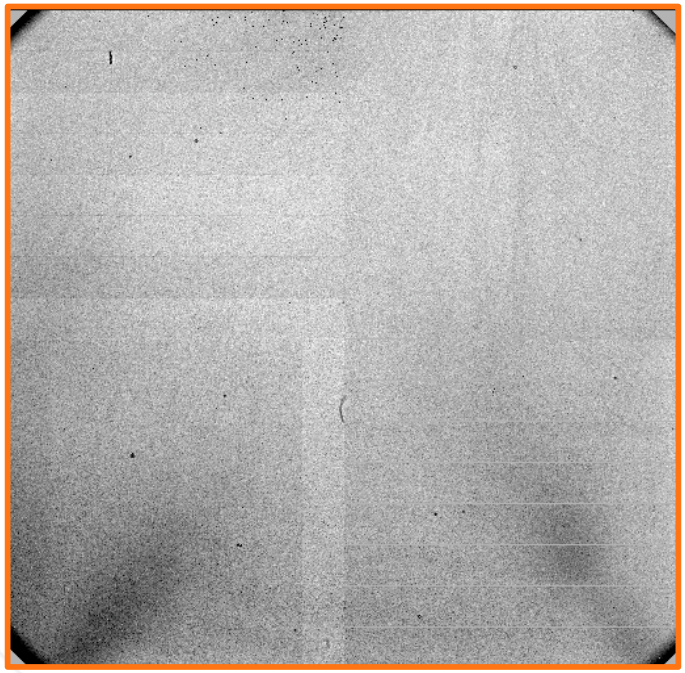
- BPM using Flats with different intensities
- Do you really want to use a F-F in NIR? (in Broad Bands)
- FlatRampExp:
  - List of images
  - BPM
  - Fit the slope for each filter (YJHKs)

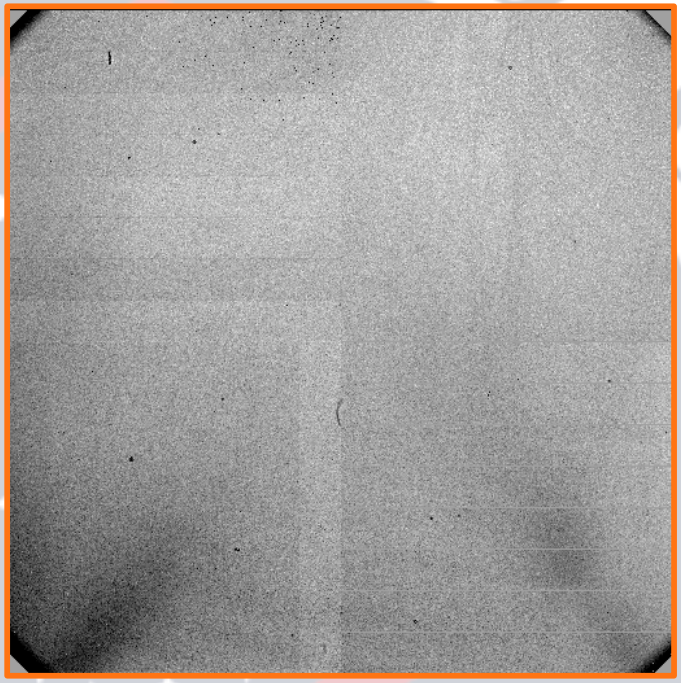


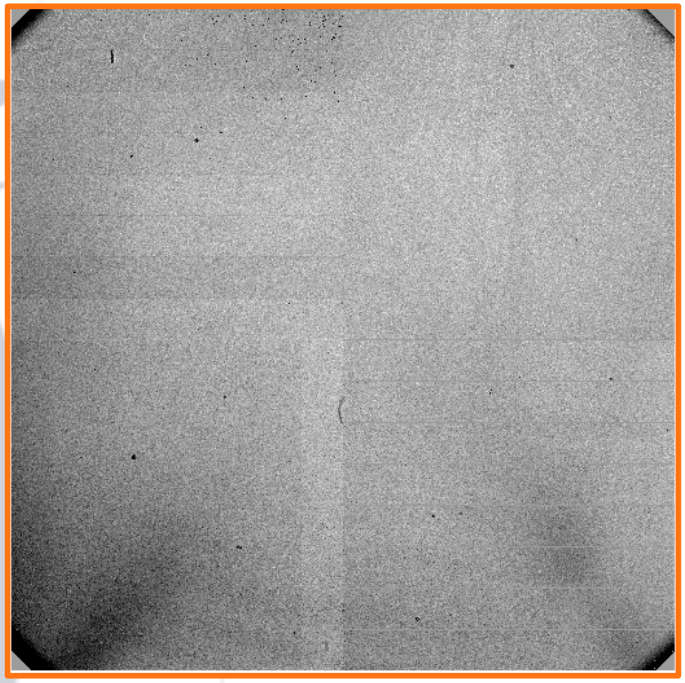


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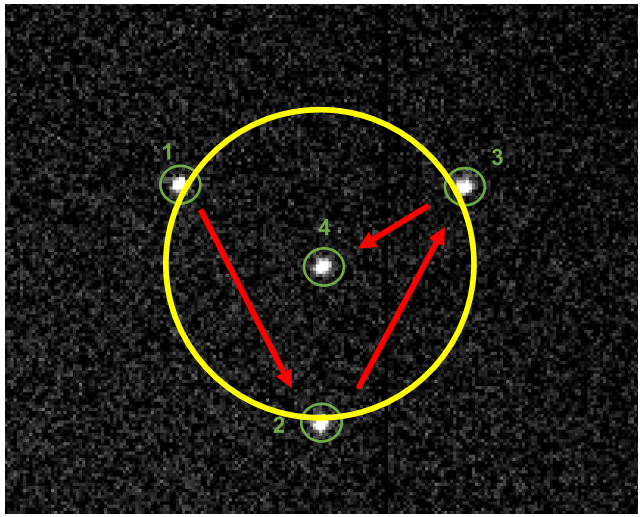


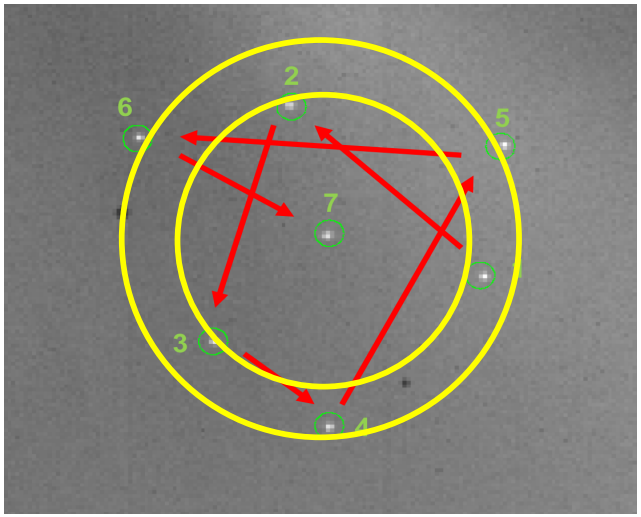




STARE IMAGE (WITHOUT SKY)

- Dithering points:1, 4 and 7
- Pointlike or small objects

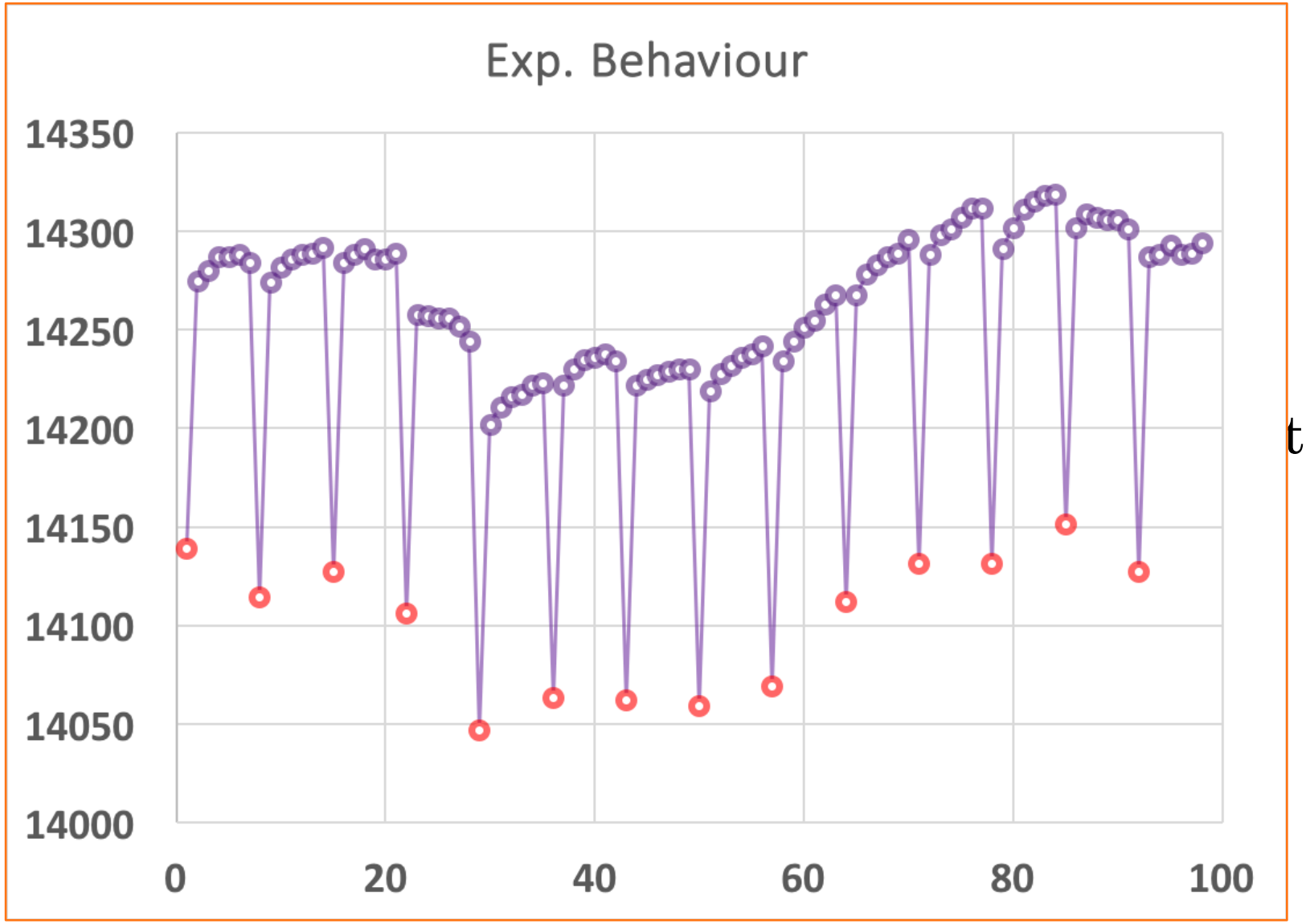




- BPM
- Sky Flat-Field (optional)

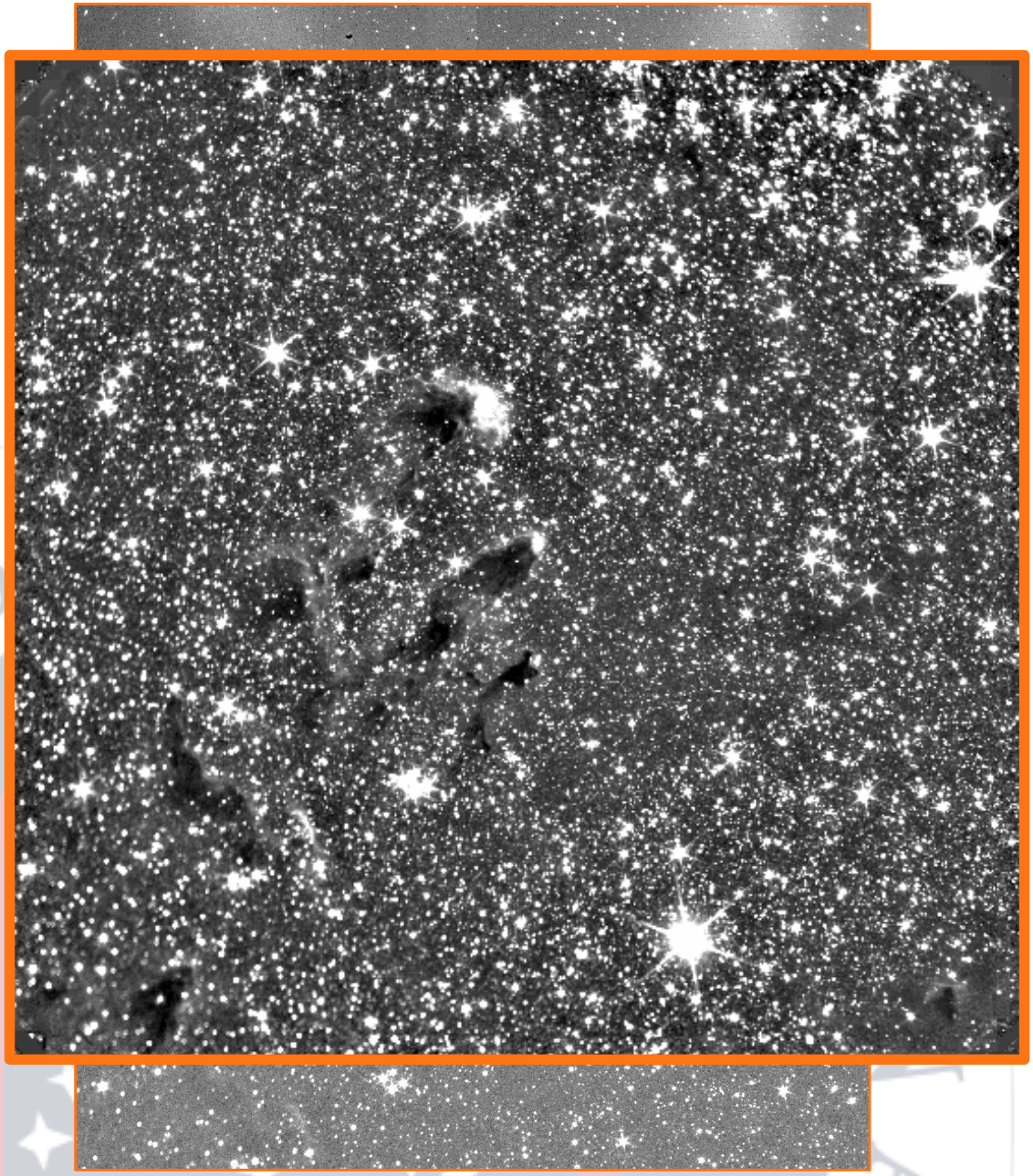
OBSMODE	STARE IMG	LS ABBA	LS SPEC
READMODE	CDS or RAMP		
OBSTYPE	OBJECT/SKY	OBJECT	OBJECT/SKY
NOBSBLCK	Nº Cycles of Dith. Pattern	Nº Cycles of ABBA	Nº Cycles of Object/Sky
NIMGOBBL	Dith. Points	4 (ABBA)	1
NEXP	Exposures in each position		

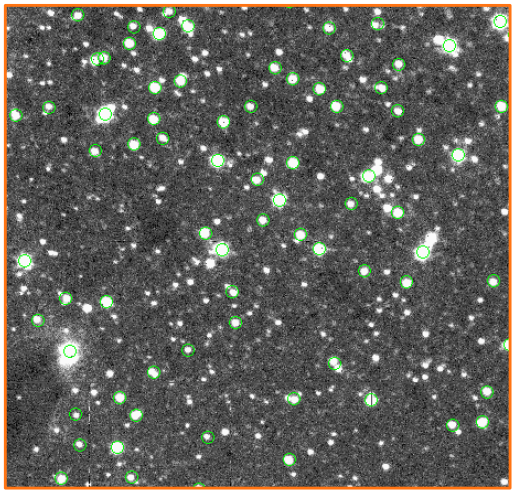
FILE	FILTER	NSEC	NEXP	EXP	NIMGOBBL	IMGOBBL	NOBSBLCK	OBSBLOCK	EXPTIME
0001302735-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	1	2	1	19.99
0001302741-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	2	2	1	19.99
0001302747-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	3	2	1	19.99
0001302753-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	4	2	1	19.99
0001302759-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	5	2	1	19.99
0001302765-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	6	2	1	19.99
0001302771-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	7	2	1	19.99
0001302777-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	1	2	2	19.99
0001302783-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	2	2	2	19.99
0001302789-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	3	2	2	19.99
0001302795-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	4	2	2	19.99
0001302801-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	5	2	2	19.99
0001302807-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	6	2	2	19.99
0001302813-***-EMIR-STARE_IMAGE.fits	J	1	1	1	7	7	2	2	19.99

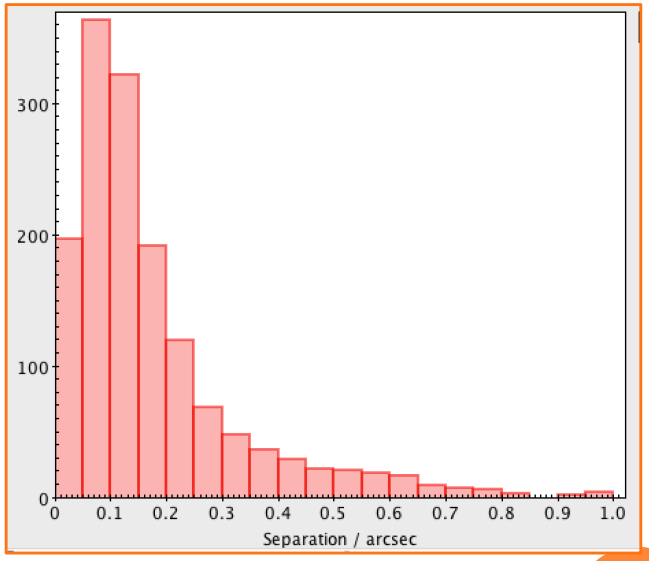

Exp. Behaviour
14350
14300
14250
14200
14150
14100
14050
14000
0
20
40
60
80
100

t.

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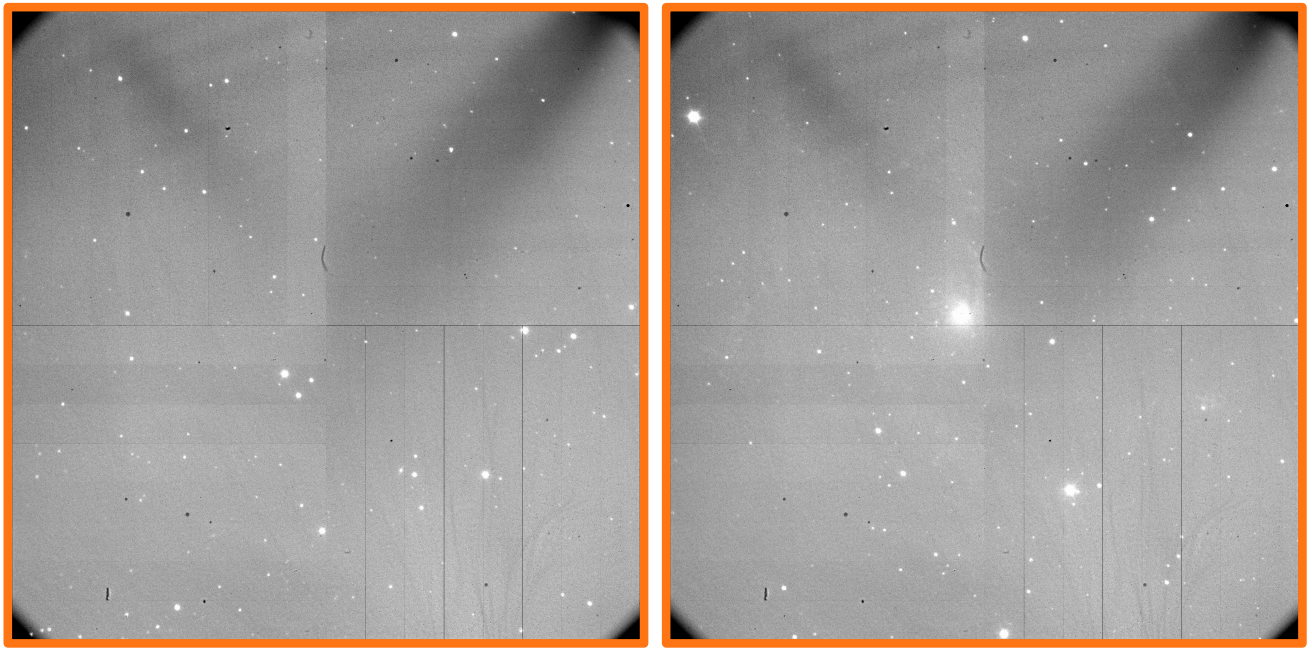


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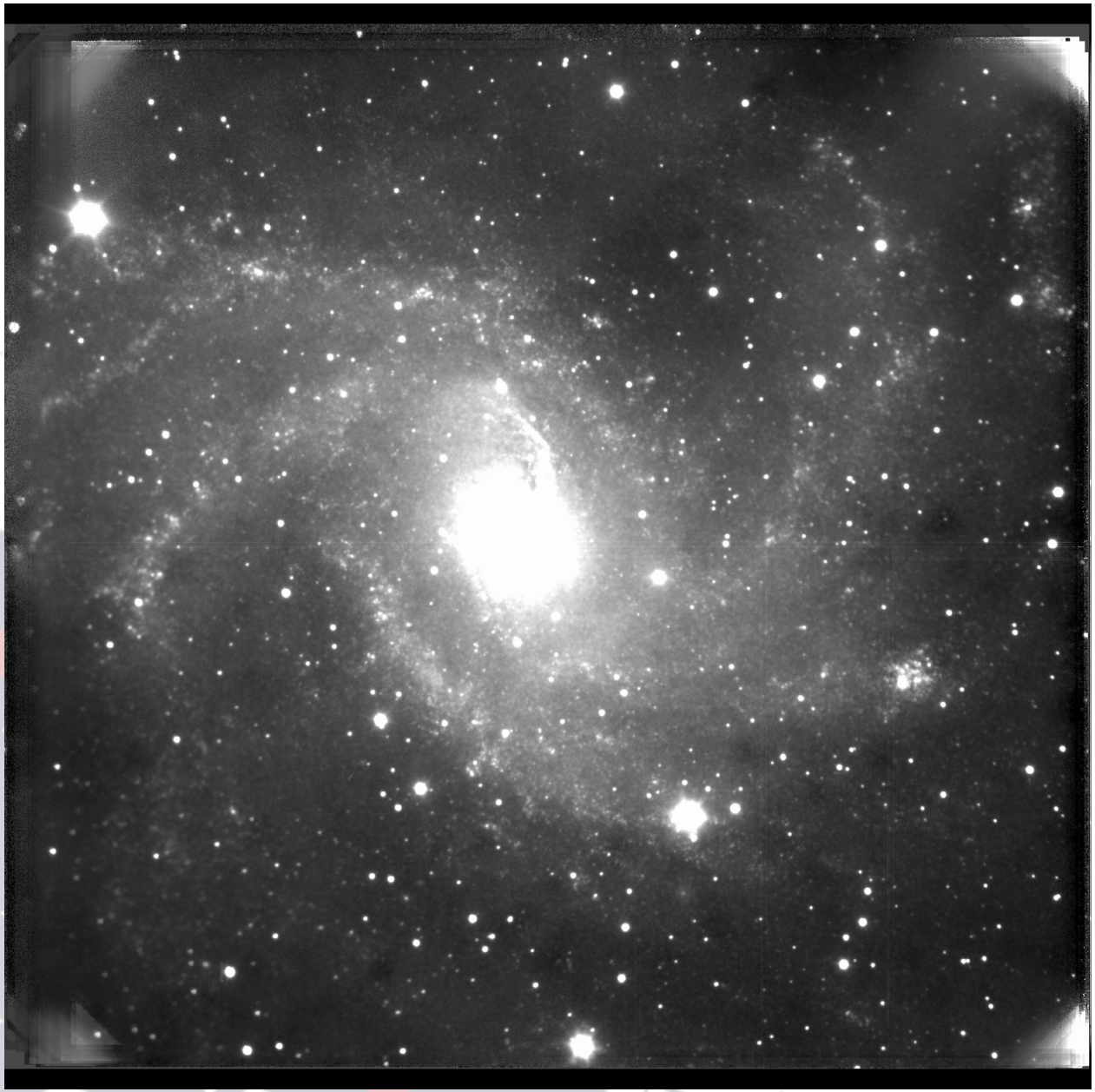


STARE IMAGE (WITH SKY)

- Using an adittional mode:
  - IMAGE_SKY
  - STARE_IMAGE
- The same Dithering Pattern for the Sky
- Offset in RA / DEC

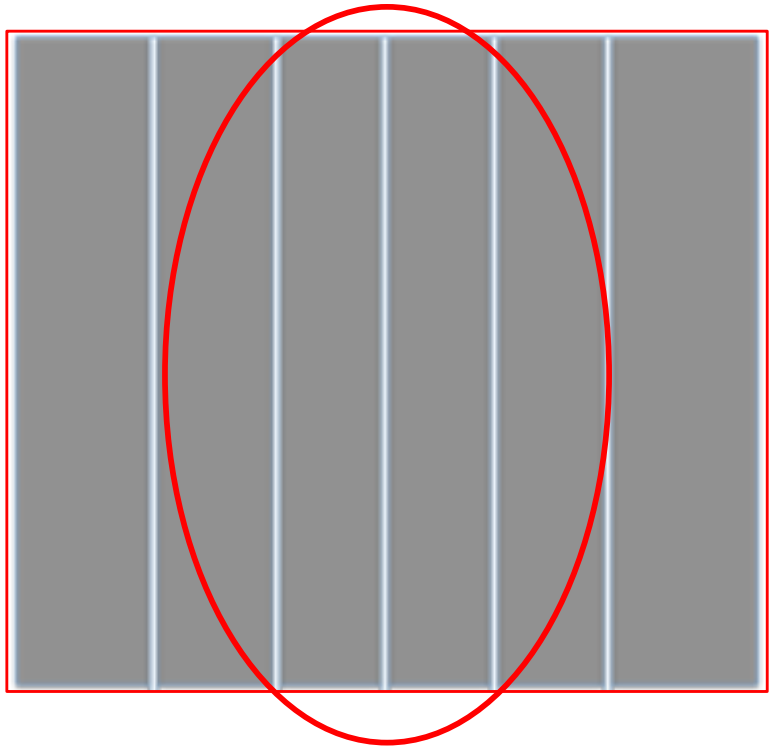


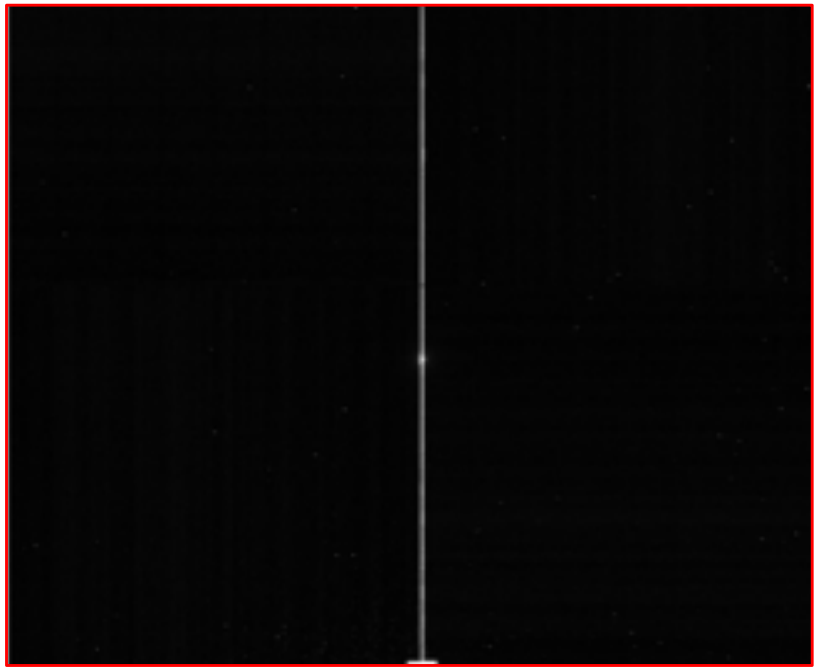
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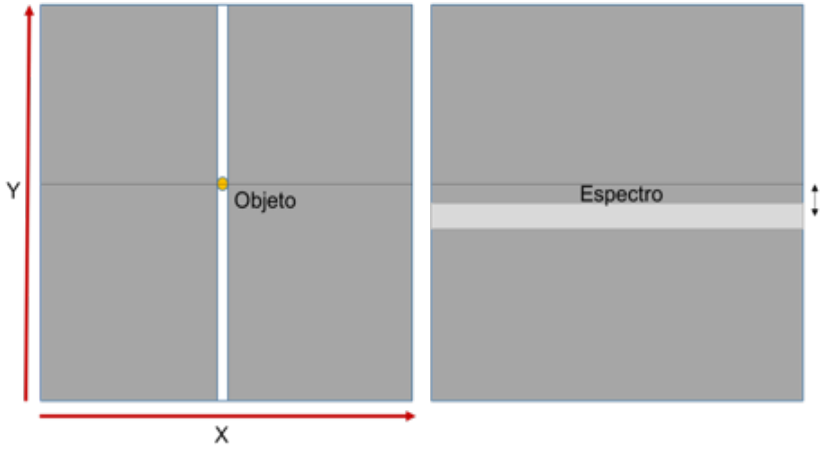
STARE SPECTRA (WITHOUT SKY)

- Dithered 4 (ABBA)
- Pointlike objects or small objects
- Slit Size: 0.6, 0.8, 1.2, 1.6, 5.0 and 10.0”

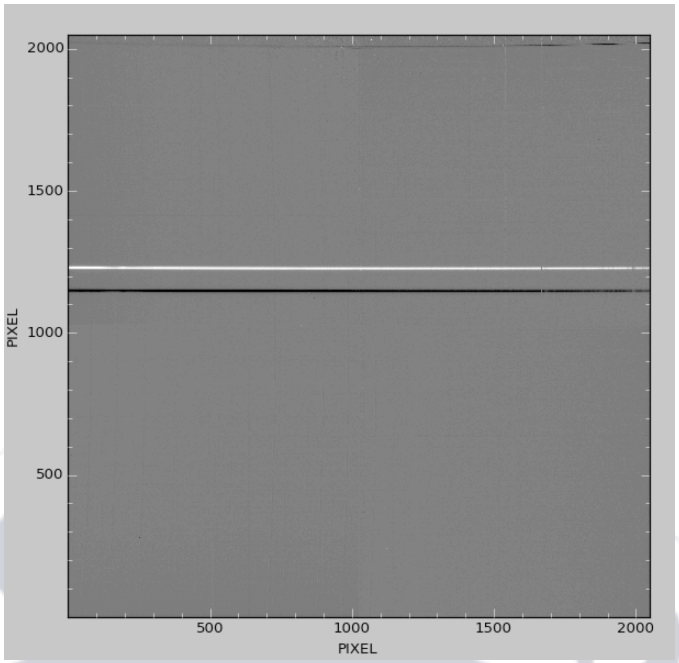


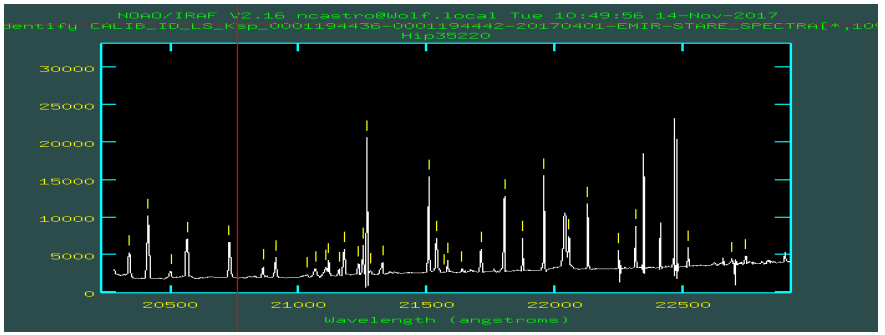


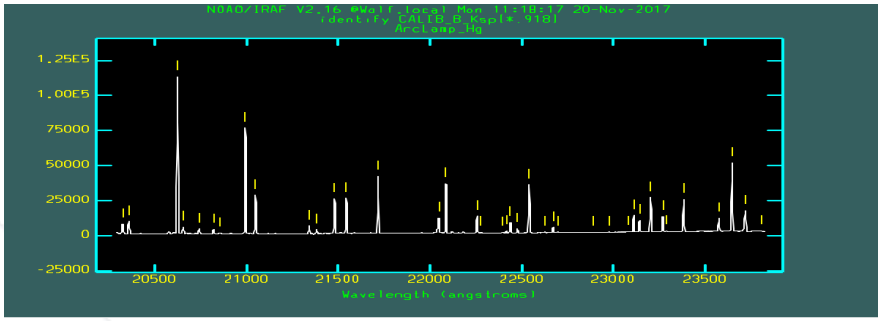
- **Input list of EmirData (txt file)**
- **Position of the object along the slit (1215 px)**
- **AB Offset (arcsec)**
- **Aperture extraction (px)**
- File of lines (OH or arcs): lineas_bright_oh.txt
- File of Arcs (ej. Arc_HgAr_Xe_Ne_K.fits)
- Mkdir “database”
- Identify the filter
- Identify the different exposures ABBA
- Wavelengh calibrations
- Apply to the images
- Combine all frames

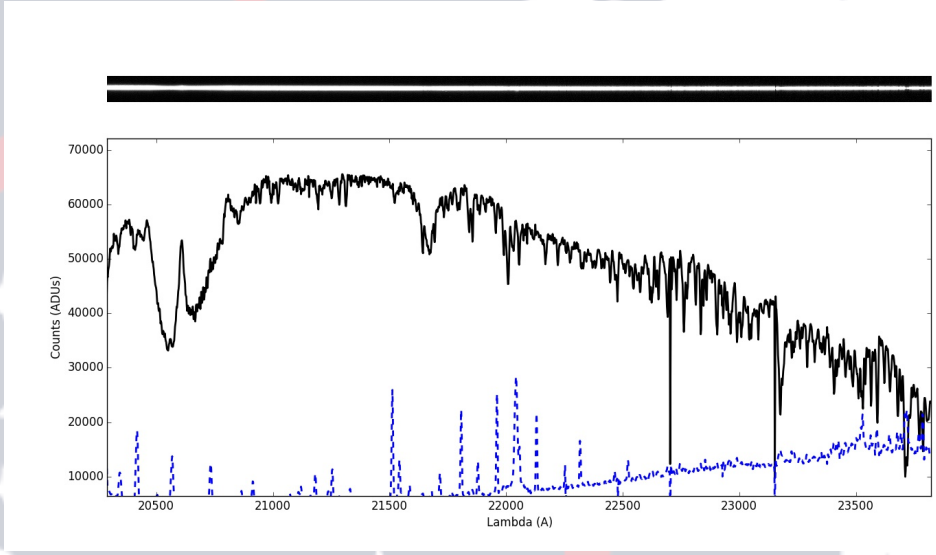


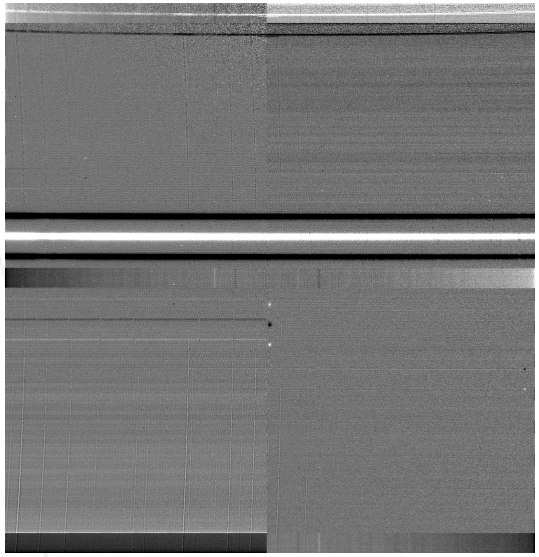
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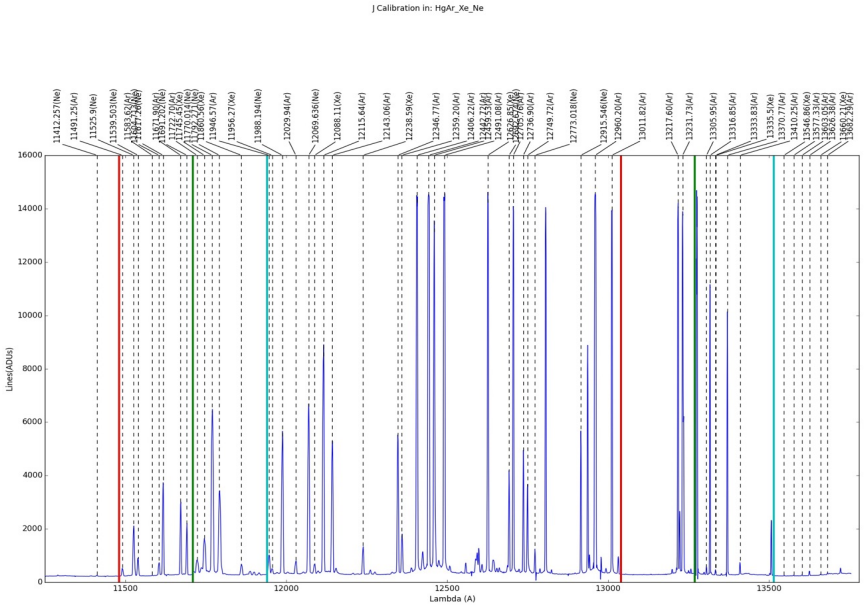


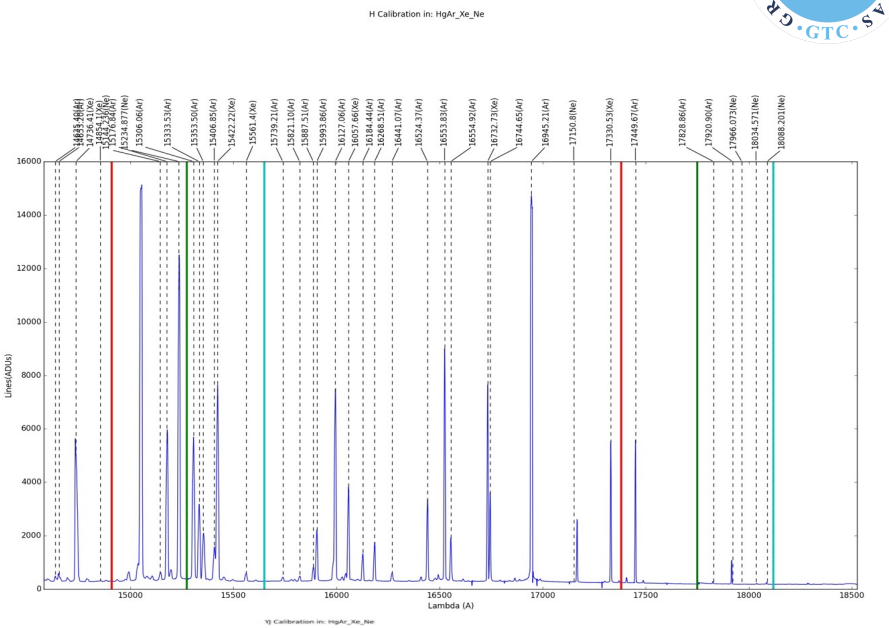


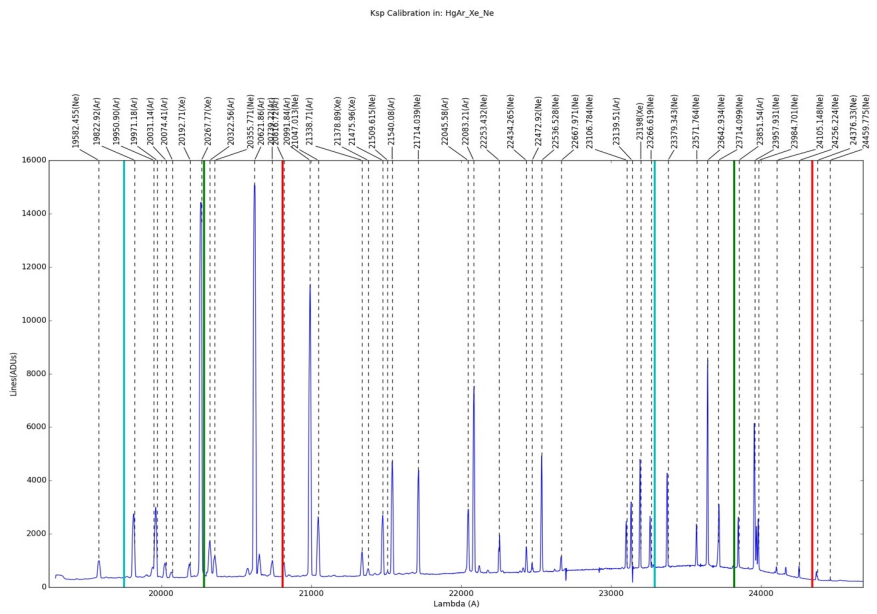


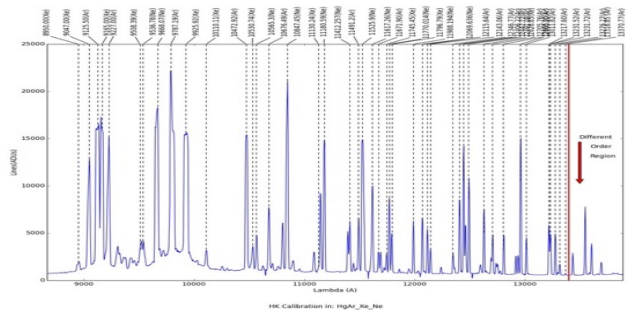


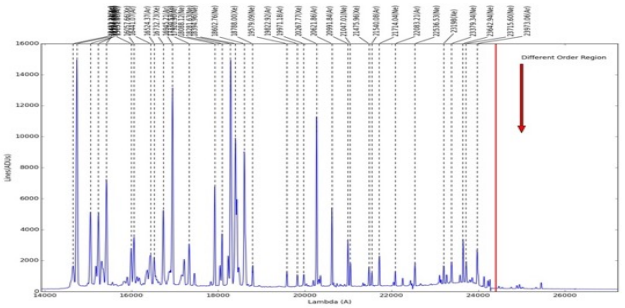
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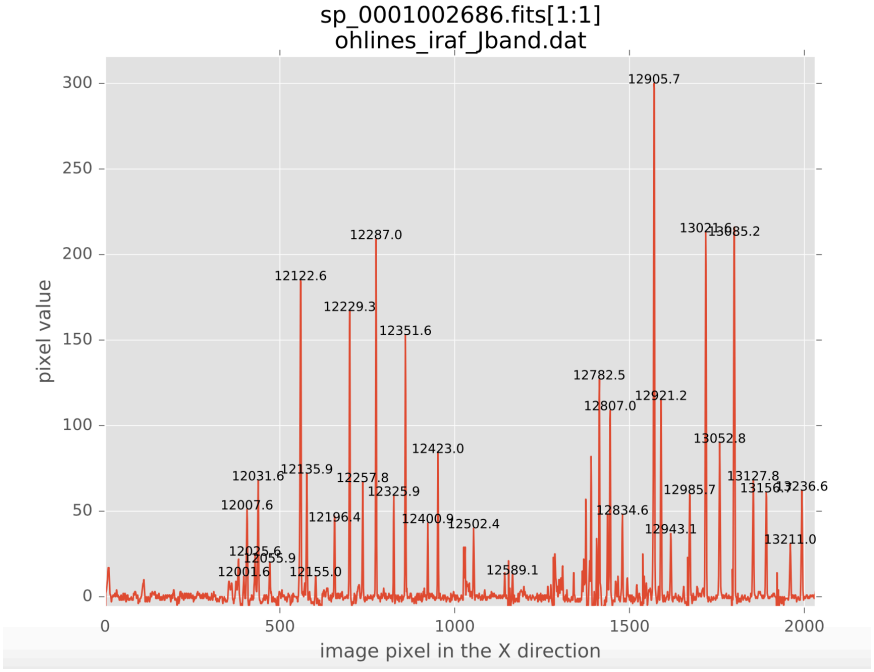


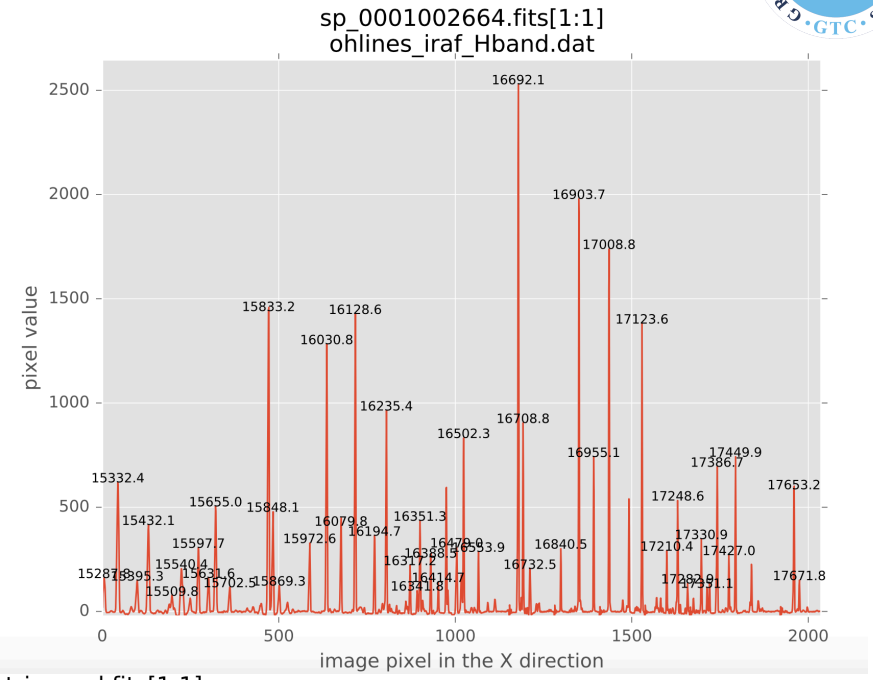


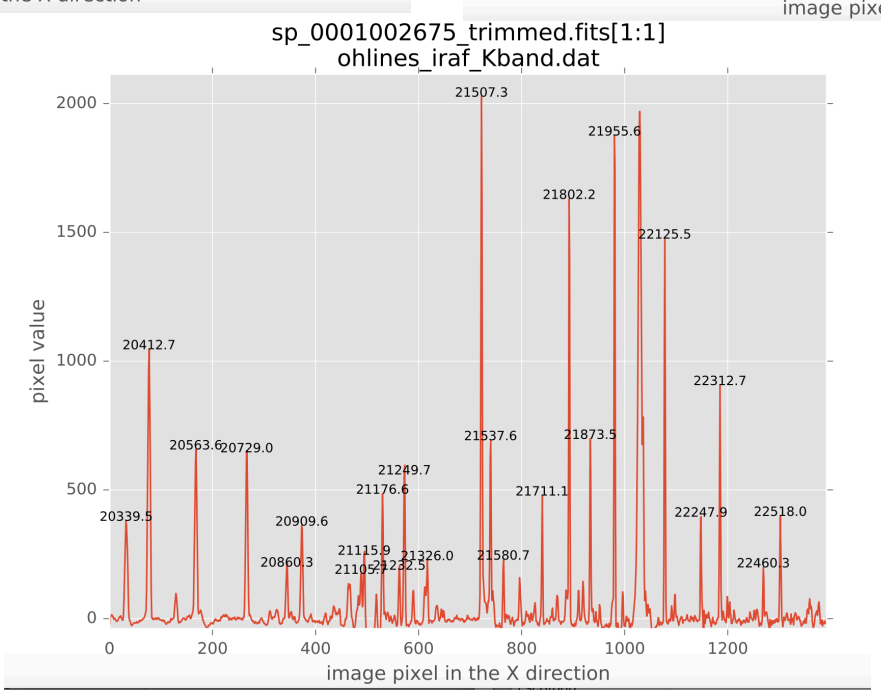




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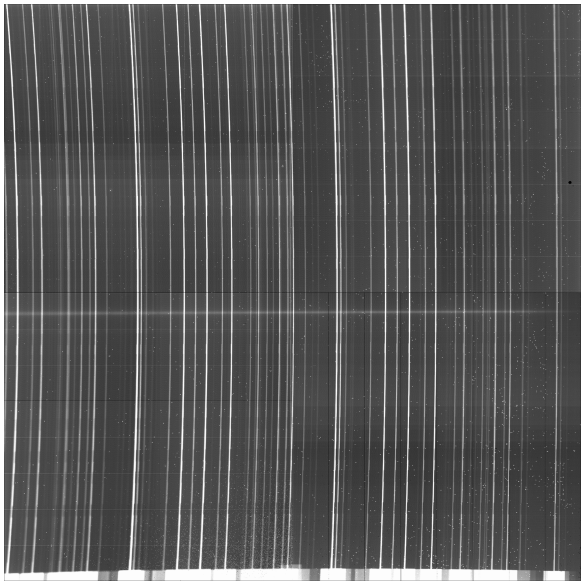
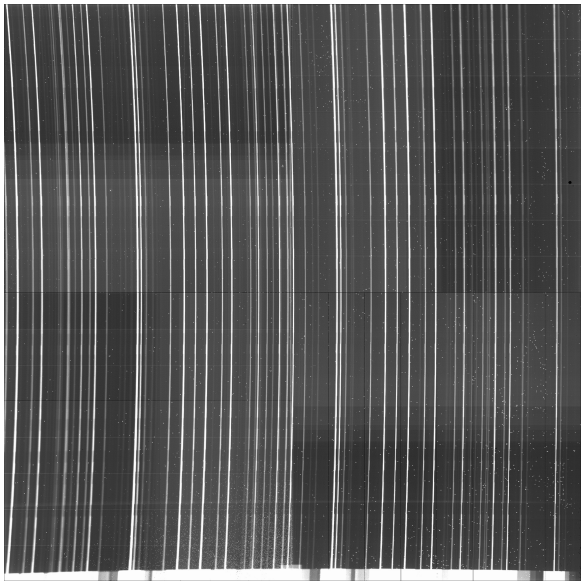
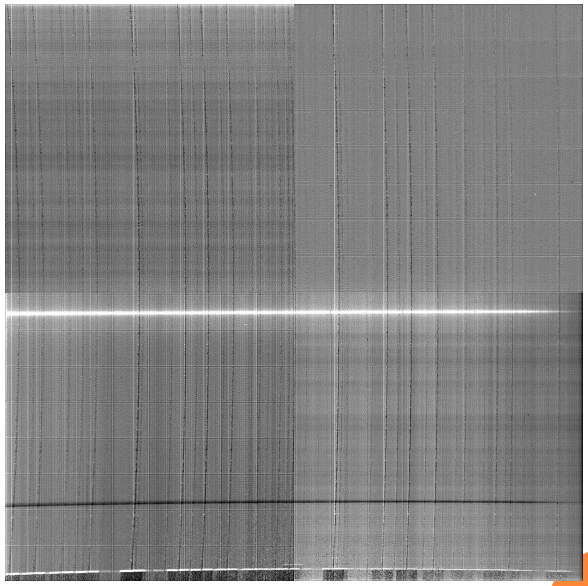






STARE SPECTRA (WITH SKY)

- Using an adittional mode:
  - SPEC_SKY
  - STARE_SPECTRA
- Only 1 pointing
- Offset in RA / DEC for Sky

THANKS AND THE DRP OFFLINE IS COMING SOON!!